REMARKS/ARGUMENTS

Claims 1-14, 16-24, 34-35 and 38-40 are active. Claims 15, 30-33 and 36 and 37 have been withdrawn from consideration. The claims have been amended for clarity and, in view of the Examiner's comments in the Advisory Action, the terms *cdc27a* and CDC27a have been retained. Claims 1, 21 and 38 have been simplified by deleting terms like "accelerated development" and "changed development" and to describe particular phenotypes. Pages 27-28 of the specification describe various phenotypes, including increased sizes or numbers of plant organs, and increased flowers and/or seeds. Claims 10-14 have been consistently revised to further limit the invention of claim 10 and claim 20 for clarity. No new matter has been introduced.

Restriction/Election

The Applicants previously elected with traverse **Group I**, claims 1-14, 16-24, 34, and 35, drawn to a method of increasing by recombinant means expression of *cd27a* in a plant or plant part, as well as plants, plant parts and genetic constructs. The requirement has been made FINAL. The Applicants respectfully request that the claims of any nonelected group which depend from or otherwise include all the limitations of an allowed elected claim, be rejoined upon an indication of allowability for the elected claim, see MPEP 821.04.

Rejection—35 U.S.C. §112, first paragraph

Claims 1, 2, 4-14, 16-24, and 34-35 were rejected under 35 U.S.C. 112, first paragraph, as lacking adequate written description. The Applicants assume that this rejection is directed to an alleged lack of description for the nucleic acid sequences "encoding a CDC27A protein that is at least 95% homologous to SEQ ID NO: 2" which appears in independent claim 1. As noted in the prior response this terminology is literally disclosed in

the original claims (see e.g., claim 5 which refers to 95% identity with SEQ ID NO: 2) as well as in the specification (see e.g., the bottom of page 6 which also discloses sequences with 95% identity to SEQ ID NO: 2).

Page 3, last paragraph, of the OA indicates that the description rejection was imposed "because Applicant has not described a representative number of species" falling with the claimed genus and no structure/function correlation. The Applicants respectfully traverse these arguments.

Initially, when the specification expressly discloses a genus, there is no need to further describe it by means of a representative number of species. The description of a genus by a representative number of species is only one way of meeting the description requirement and is often employed when the claimed genus is not expressly described. However, it is not the only or even the best way. In the present case, the explicit disclosure of the claimed genus in the specification clearly demonstrates that the Applicants possessed the concept of a genus of nucleic acids encoding polypeptides at least 95% identical to SEQ ID NO: 2.

With respect to the alleged lack of a structure/function correlation in independent claim 1, this does not claim a structure/function relationship. Therefore, descriptive support of such a relationship is not required. However, to further simplify and clarify claim 1, the term "CDC27A" protein has been deleted since the claim clearly describes the sequences by reference to a 95% degree of homology to SEQ ID NO: 2.

Accordingly, the Applicants respectfully submit that this rejection is unsustainable in view of the express disclosure of the claimed subject matter in the specification and should be withdrawn.

Rejection—35 U.S.C. §112, first paragraph

Claims 1, 2, 4-14, 16-24, and 34-35 were rejected under 35 U.S.C. 112, first paragraph, as lacking adequate enablement for methods involving sequences other than SEQ ID NO: 1 or polynucleotides encoding the exact sequence of SEQ ID NO: 2. The rationale for the rejection is that introduction of changes to SEQ ID NO: 2 introduces unpredictability in the effects the modified sequences would have in plants and, therefore, that undue experimentation would have been required to identify which sequences encoding polypeptides at least 95% homologous to SEQ ID NO: 2 would be useful.

The Applicants respectfully traverse this rejection, because even a considerable amount of experimentation is permissible, if it is merely routine, or if the specification provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed, *In re Wands*, 858 F.2d 731 (Fed. Cir. 1988). Based on the application of the factors described by *Wands*, no undue experimentation would have been required to practice the invention.

(A) the breadth of the present claims limits the nucleic acid sequences to those which encode the polypeptide of SEQ ID NO: 2 or a polypeptide that is 95% homologous to SEQ ID NO: 2. There are a limited number of such polynucleotide sequences and such are well-known to those of skill in the art.

(B) The nature of the invention involves a method for modifying plant development by transforming a plant with a polynucleotide encoding CDC27A (e.g., the polypeptide of SEQ ID NO: 2). The necessary steps of this method are straightforward and well within the skill of those in the art.

(C) The state of the prior art shows that methods for the identification of functional homologs (e.g., of polypeptides 95% homologous to SEQ ID NO: 2) were well-known and multiple different methods are disclosed on pages 7-9 of the specification.

(D) The level of ordinary skill in the molecular biological arts is high, generally Ph.D or post-doctoral level.

(E) The level of predictability in the art is high, since the polynucleotides encode polypeptides having a very high degree of structural similarity (i.e., 95% or more) and methods for routine identification of functional sequences were well-known.

(F) and (G) The amount of direction provided by the present inventors is high and the claimed method is exemplified.

(H) The quantity of experimentation needed to make or use the invention is limited to merely identifying polynucleotides encoding polypeptides 95% homologous to SEQ ID NO: 2 that modify plant development.

Accordingly, undue experimentation would not have been required to identify nucleic acid sequences for use in the invention in view of the narrow genus of highly homologous sequences claimed and numerous well-known and disclosed screening methods to identify useful sequences.

Rejection—35 U.S.C. §112, second paragraph

Claim 21 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is moot in view of the amendment above.

Rejection—35 U.S.C. §112, second paragraph

Claims 10 and 11-13 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is moot in view of the amendment above.

Rejection—35 U.S.C. §112, second paragraph

Claim 20 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This rejection is moot in view of the amendment above.

Rejection—35 U.S.C. §102(b)

Claims 14, 21, 22, 23, and 24 were rejected under 35 U.S.C. 102(b) as being anticipated by Hemerly, et al., WO 01/02430. Claim 14 requires "introducing into a plant, a nucleic acid sequence capable of increasing expression of a *cdc27a* gene and/or capable of increasing levels of a CDC27A protein". Claim 14 now depends from claim 1, which was not rejected. Accordingly, this rejection no longer applies.

Rejection—35 U.S.C. §102(b)

Claims 14, 21, 22, 23, 24 and 38 were rejected under 35 U.S.C. 102(b) as being anticipated by Hemerly, et al., WO 01/02430. The OA indicates that the *cdc27a* nucleic acid sequence taught by Hemerly encodes an amino acid sequence that is at least 95% identical to SEQ ID NO: 2. However, the sequence alignment provided does not appear to be prior art because it refers to sequence revised 24-JUL-2008. Assuming *arguendo* that Hemerly discloses a prior art polynucleotide sequence, this rejection is moot for claim 14 which now depends from claim 1, which was not rejected and for independent claims 21 and 38 which each now require sequences active in plant cells that provide a modified phenotype, not disclosed by Hemerly. Accordingly, this rejection cannot be sustained.

Rejection—35 U.S.C. §103

Claims 1-13, 16-21, 34-35 and 39-40 were rejected under 35 U.S.C. 103(a) as being unpatentable over Hemerly, et al., WO 01/02430, in view of John, U.S. Patent No. 5,750,862. This rejection may be withdrawn because neither reference discloses a method (or products) that provide a transformed plant having accelerated development resulting in the modified phenotypes of increased plant organ size, increased numbers of a plant organ, and earlier flowering as required by the claims.

A key point of understanding is that the biological processes controlling mitosis are distinct from those accelerating development and resulting in the modified phenotypes of the present invention—increased organ size or numbers or earlier flowering. Altering plant development requires not only mitosis (cell division), but also other processes such as organogenesis. Moreover, the phenotypes of the invention require a precise sequence of events and a tight coordination of the activity of factors influencing mitosis, organogenesis, and plant development.

The mere stimulation of mitosis does not necessarily result in increased plant organ size or number or in earlier flowering. Those of skill in the art understood that uncontrolled cellular proliferation results in abnormal development and disruption of organ formation. Cell proliferation (accelerated mitosis) is typically associated with an undifferentiated cell phenotype, e.g., a tumor-like phenotype rather than with a well organized differentiated stages providing the modified phenotypes of the invention. Thus, one of ordinary skill in the art would not have had a reasonable expectation of success for producing differentiated phenotypes of increases in plant organ size and numbers or earlier flowering based on any prior art teachings of agents that stimulate plant cell division.

On the other hand, the present claims are directed to a method employing the *cdc27a* nucleic acid sequence and selecting a transformant that has increased plant organ size,

increased numbers of a plant organ or earlier flowering. These processes "are based on *differentiation* of the cells and *developmental patterns* rather than merely on stimulation of DNA synthesis and cell division (specification, page 3, lines 14-15). Hemerly (and also John) provide no suggestion or expectation of success that the claimed method would provide these differentiated phenotypes as opposed to, for example, stimulating undifferentiated plant cell tissue (callus).

The Examiner and Applicants are agreed that Hemerly does not teach this element of the invention, namely selection based on these particular modified phenotypes. At best, Hemerly (top of page 33) indicates that over-expression of CDC27 protein might provide extra rounds of DNA replication before mitosis leading to polyploid cells. However, there is no teaching relating over-expression of CDC27 protein to changes in differentiation and development patterns, such as increased plant organ size, increased numbers of a plant organ, earlier flowering, or accelerated development.

John does not teach these steps or provide an expectation of success for these phenotypes either. John is non-analogous art, because it pertains to cell cycle control proteins such as $p3^{4cdc2}$ and not to *cdc27a* (see abstract and the last two lines in col. 1 continuing into col. 2). However, it has been applied as a general reference teaching proteins that modifying or controlling cell division. However, it cannot provide a reasonable expectation of success for the invention, because it does not describe the properties of *cdc27a*. The middle of page 9 of the OA states that John "teaches methods for controlling plant cell growth comprising modulating the level and/or catalytic activity of a cell cycle control protein. . .to modify or control cell division". As discussed above, modifying cell division is not the same as providing controlling processes resulting in the differentiated plant organ phenotypes provided by the invention. Thus, neither Hemerly, nor John, provides a reasonable expectation of success that transformants containing *cdc27a* (and expressing CDC27a

protein) would exhibit, and could be selected for, such modified phenotypes. Hemerly, as noted in the rejection, is silent about this.

Accordingly, the cited prior art does not disclose or suggest all the steps or elements of the invention and provides no reasonable expectation of success for the claimed methods (and products) that produce the differentiated phenotypes of increased organ size and number and earlier flowering. This rejection therefore cannot be sustained.

Conclusion

In view of the amendments and remarks above, the Applicants respectfully submit that this application is now in condition for allowance. An early notice to that effect is earnestly solicited.

Respectfully submitted,

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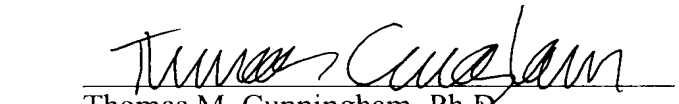

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